

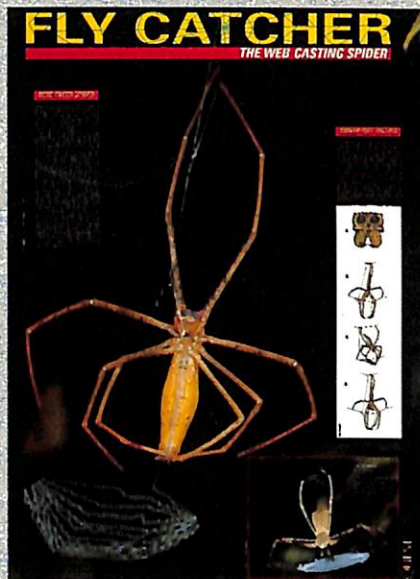
INSIDE THIS PACK

FACT FILES

- Electric drills and screwdrivers
- Computer-monitored tractors
- Air turbine dental drills
- Computer integrated manufacture
- Anti-torque Space tools
- Bulldozers

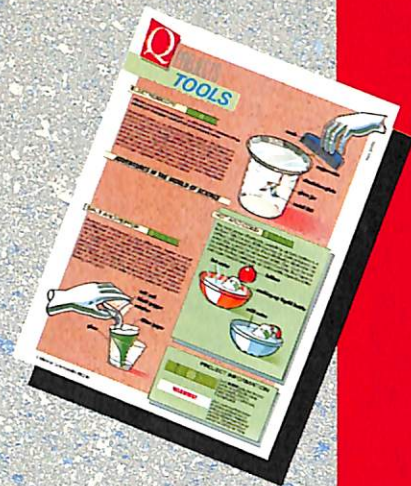


MODEL Bulldozer

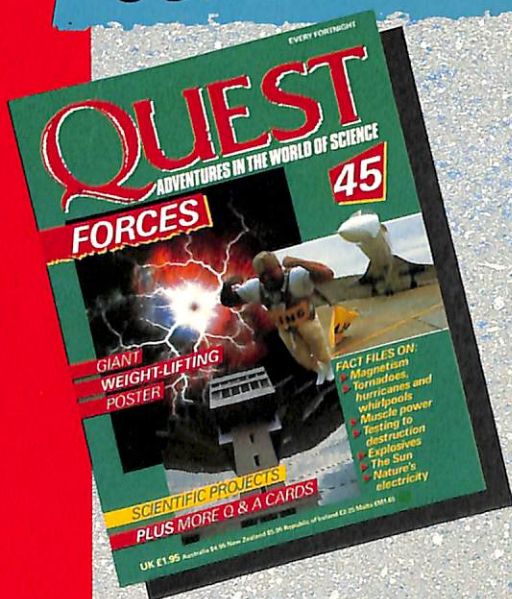


POSTER
The ogre-faced spider

THREE SCIENTIFIC PROJECTS

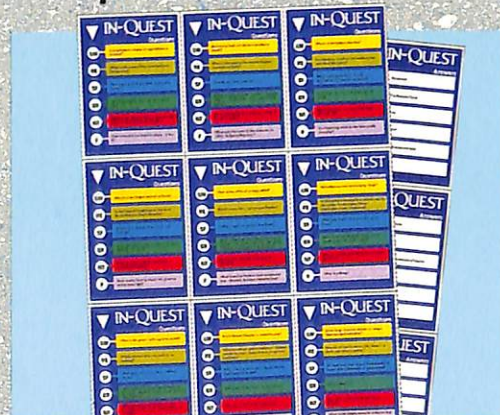


COMING IN QUEST 45 FORCES

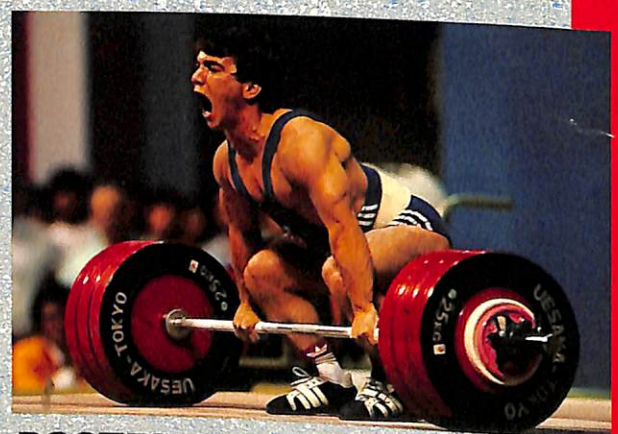


FACT FILES INCLUDE:

- Magnetic fields
- Role of the Sun
- Natural electricity
- Muscle power
- Wind and water
- Prototype testing
- Explosions



More In-Quest Q & A cards



POSTER
Power weightlifter

ISSN 1350-3766



QUEST

ADVENTURES IN THE WORLD OF SCIENCE

TOOLS

44

THREE PROJECTS

MAKE A BULLDOZER

- FACT FILES ON:**
- ▶ Hand-held power
 - ▶ Farm machines
 - ▶ Dental instruments
 - ▶ Mega cutters
 - ▶ Space tools
 - ▶ Giant earthmovers
 - ▶ Surgical kit

**GIANT POSTER:
WEB-CASTING SPIDER**



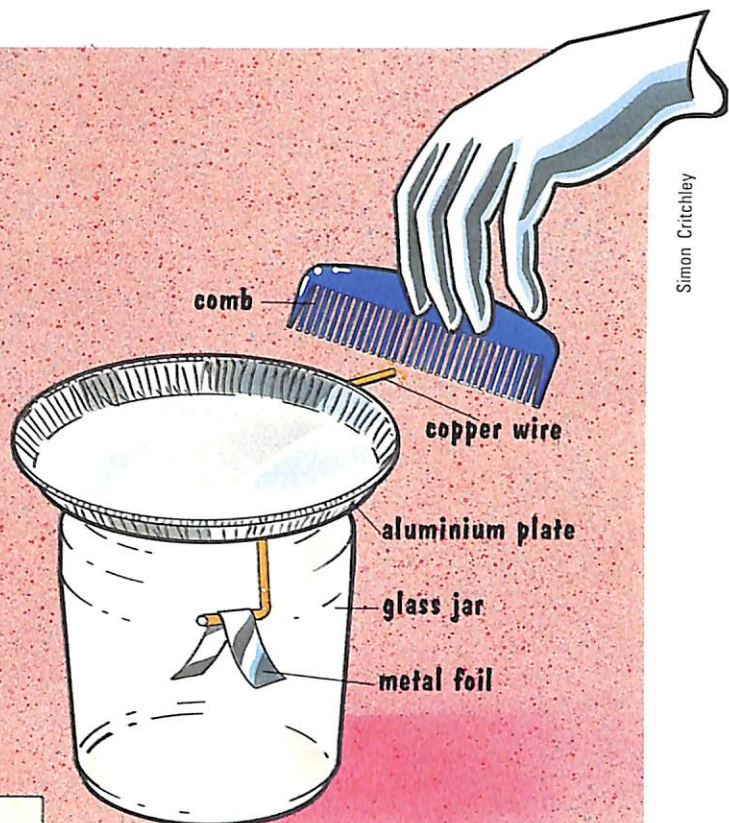
PROJECTS TOOLS

ELECTROSCOPE



Make an electroscope – a device for measuring electrical charges – out of foil and copper wire.

You need a glass jar, an aluminium plate, a length of copper wire and piece of thin metal foil. Bend the copper wire into the shape of a Z and hang it over the edge of the jar. Fold the foil strip and hang it over the lower horizontal part of the copper wire. Place the aluminium plate over the jar (a plain sheet of metal with round edges will do just as well). Charge the comb with static electricity by running it through your hair. Bring it up to the piece of exposed wire and you will notice the strips of metal repel each other. Any electrically charged object will have the same effect.



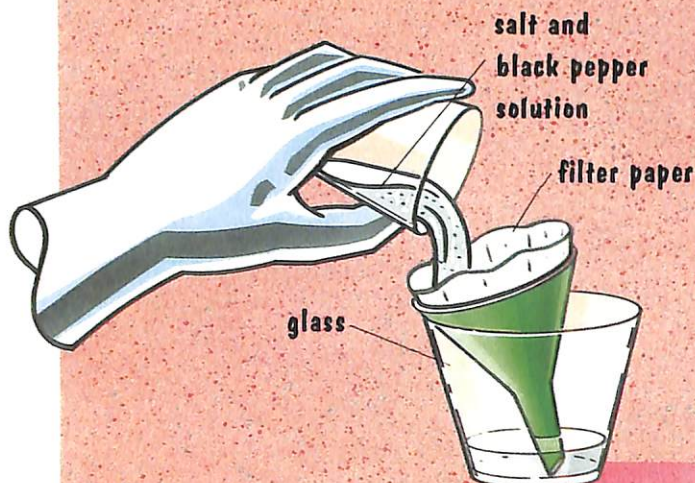
Simon Critchley

ADVENTURES IN THE WORLD OF SCIENCE

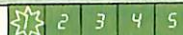
SALT AND PEPPER



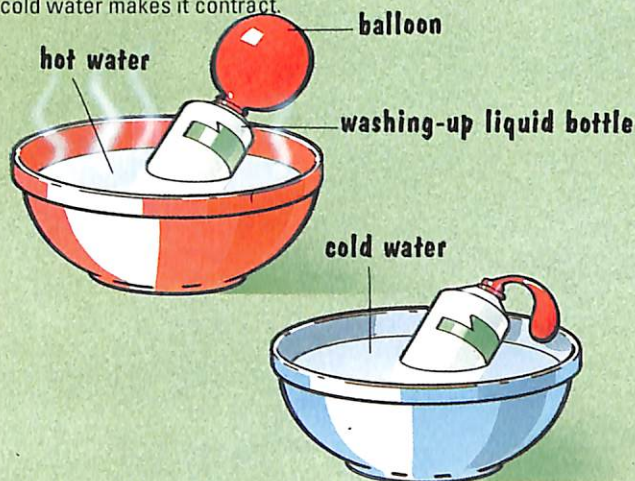
You need salt, black pepper, a glass of hot water, a spoon, a funnel, a coffee filter or sheet of absorbent kitchen paper, a glass and a plate. Mix the salt and pepper together thoroughly, then pour them into the glass of hot water. Stir until the salt dissolves. Fold the filter or kitchen paper into the funnel, place the funnel in the glass, then pour the salt and pepper mixture into it. The salt water will pass through, but the pepper will become trapped in the paper. Spread the paper out and allow the pepper to dry. Pour the salt solution on to the plate. After a day or two the water will evaporate, leaving salt crystals.



HOT AND COLD



You need a bowl of hot water, a washing-up liquid bottle and a balloon. Take the cap off the washing-up bottle and place the deflated balloon over the top. Place the bottle in the bowl of hot water. After a while the balloon will inflate. Then place the bottle in the bowl of cold water and watch it deflate. This happens because the heat makes the air in the bottle expand and the cold water makes it contract.



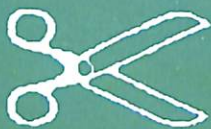
PROJECT INFORMATION



Each **QUEST** project and model has its own difficulty rating: 1 very simple, 2 simple, 3 intermediate, 4 advanced, 5 complicated.

WARNING!

Every care has been taken to ensure projects are as safe as possible. However, parents should supervise all projects. The publisher can accept no liability for injury.



MODEL

ASSEMBLY INSTRUCTIONS

1 2 3 4

You will need

Scissors • Ruler • Craft knife • Glue • Two or three cocktail sticks

Before cutting out the pieces, score along all broken lines with a blunt edge and ruler to make folding and gluing easier. Study the ASSEMBLY DIAGRAM to see how the pieces fit together, and use the dotted lines as a guide for positioning.

NB Younger children will need supervision when using a craft knife.

To make up

Body

1 Cut out radiator **A**, pierce holes at centre of crosses, fold to shape and glue flaps into position. Cut out **B**, **C** and **D**. Fold down tabs on **B** and glue to **D** (SEE ASSEMBLY DIAGRAM). Repeat with **C**, attaching it to other side of **D**.

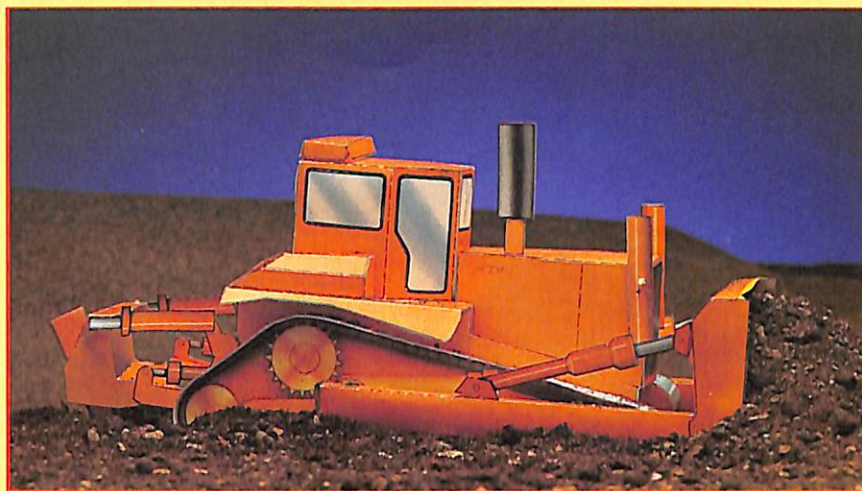
2 Position **A** between **B** and **C** (SEE ASSEMBLY DIAGRAM) and, to fix **A** in place, apply glue to tab on **B** and tab on **C** and stick to **A**.

3 Cut out **E**, fold to shape and glue flaps to **A/B/C**, following positioning marks. Cut out **F**, spread glue on folded down flaps and glue to underside of **A/B/C**.

4 Cut out **G** and stick flaps to **F**, aligning broken line farthest away from positioning marks on **G** with dotted line on **F**. Cut out **H**, fold and glue to shape. Repeat with **I**. Glue **H** and **I** to **E**, following positioning dots.

5 Cut out **J** and apply glue to upper side of narrow flap. Stick flap to edge of **E**, between **H** and **I**. Apply glue to three tabs on

BULLDOZER



H and stick tabs to **J**. Repeat with **I** and other end of **J**.

6 Cut out cab **K** and fold and glue to shape. Glue **K** to **E**, **H** and **I**. Cut out rollover bar **L**, fold to shape, glue tabs in place and stick to cab roof.

Caterpillar tracks

1 Cut out **M**, **N** and **O**. Cut out hole in **M**. Fold down tabs on **M**, wrap **N** around **M** and glue, aligning broken line with dotted line, so that **N** projects a little. Glue tabs on other side of **M** to **O**.

2 Repeat with **P**, **Q** and **R**. Glue **O** to **C** and **Q** to **B**.

Straight pushing blade

1 Cut out **S** and form into tube. Cut out **T** and glue into shape. Cut out hydraulic ram **U** and fold down tabs. Glue larger tab to side of **T**, following positioning dots. Glue **S** on to circle on **T**. Repeat with **V**, **W** and **X**.

2 Cut out **Y** and **Z**. Pierce small holes in **Y** and **Z** at centre of crosses. Cut out blade **A1** and fold to shape. Glue **Y** and **Z** to **A1**

where indicated (see ASSEMBLY DIAGRAM). Cut out blade sides **B1** and **C1** and glue into position.

3 Cut out **D1**, make hole at centre of cross, fold in two and stick down tab. Cut out **F1**, cut hole in cross, and insert narrow end into **D1**. Repeat with **E1** and **G1**. Glue **W** and **T** to bottom corners of **A1**, following positioning dots.

Ripper for cutting through rock

1 Cut out **H1**, apply glue to underside of tabs and stick to **D** and **G**, following positioning marks. Cut out **J1**, fold into shape and glue down tabs.

2 Cut out hydraulic ram **K1**. Apply glue to flap on side of **J1** and attach **K1**. Cut out **L1** and attach to other side of **J1**. Glue two tabs on back of **J1** to **G**, where indicated by dots. Glue end of **L1** to inner side of **I1** and **K1** to inner side of **H1**, following positioning marks (SEE ASSEMBLY DIAGRAM).

3 Cut out **M1**, including slit, fold to shape and glue two triangular tabs down. Cut out **N1** and fold tab forwards. Spread glue on two tabs on side of **M1** and attach **N1**. Repeat with **O1**, sticking it to other side of **M1**.

4 Cut out ripper blade **P1**, fold in half, glue the two halves together and push through slit in **M1**. Apply glue to inner side of curved ends of **N1** and stick to **J1** (SEE ASSEMBLY DIAGRAM). Repeat with **O1**.

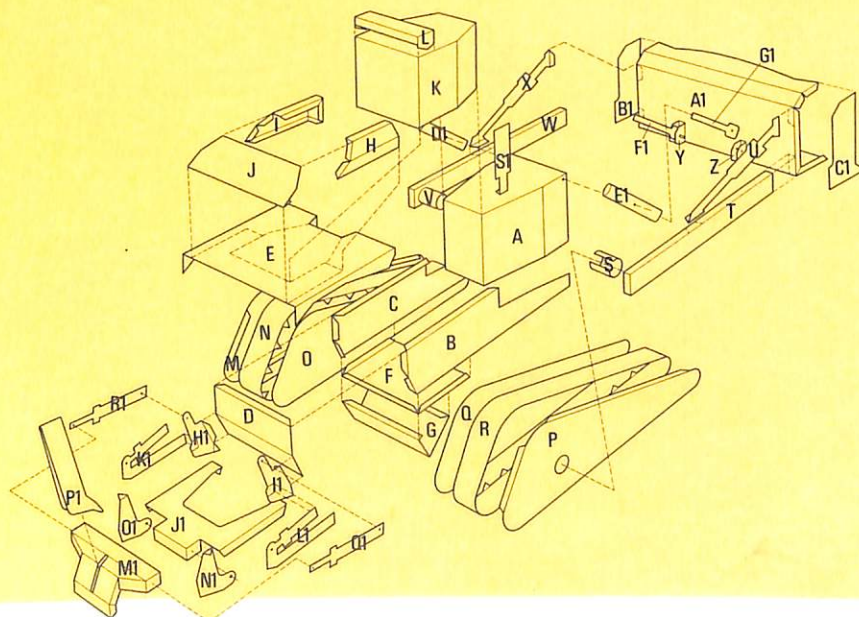
5 Cut out hydraulic rams **Q1** and **R1**. After gluing narrow end of **Q1** to top end of **M1**, stick other end to rounded end of **I1**. Repeat, gluing **R1** to **M1** and **H1**.

To finish

1 Thread cocktail stick through hole in cross on **Y**, then **F1**, then other side of **Y**. Trim ends of stick. Thread stick through side of **X**, **G1** and other side of **X**. Trim stick.

2 Push tube **S** into hole in **P** and **V** into hole in **M**. Thread cocktail stick through holes in **D1**, near side of **A**, far side of **A** and, finally, **E1**. Trim ends of stick.

3 To complete hydraulic rams, push **F1** into **E1** and **G1** into **D1**. Cut out exhaust **S1** and glue folded tab to top of **A**.



FLY CATCHER

THE WEB-CASTING SPIDER

OGRE-FACED SPIDER

Spiders are members of a class of animals called arachnids that also includes scorpions and ticks. Arachnids have four pairs of jointed legs, two body segments and clawed pincers for jaws, but no antennae or wings.

The ogre-faced spider (Latin name

Dinopis) lives in tropical regions all over the world and is identifiable by its long

legs – measuring up to 150 mm – and its

two large eyes. It is carnivorous, para-

lysing prey with a venomous bite. By day

this nocturnal spider hides in shrubs; at

night it comes out to hunt and feed,

locating its prey in the dark. This it is

able to do because of its extraordinary

eyes. Of eight eyes positioned around

the head, six are small but the two eyes

at the back of its head are (relatively

speaking) huge – 1.4 mm in diameter.

They look similar to those of the jumping

spider, but the eyes of the ogre-faced

spider are 2,000 times more sensitive to

light, allowing it to see in the dark.

The ogre-faced spider is also known

as the net-casting spider because of its

method of catching prey. Rather than

spinning a web between fixed supports

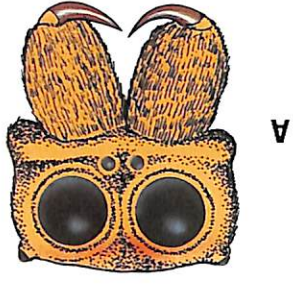
and waiting for insects to become

trapped in it, the spider (suspended from

a support) holds a small web between its

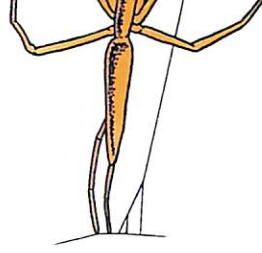
front legs. It lies in wait and casts the

web over likely prey.



A

B



The ogre-faced spider uses its two large eyes (A) to see in the dark as it waits for an unwary insect to come within range of its net. Hanging upside down from a network of threads, the spider cradles a rectangular-shaped net between its front legs (B), and then, at the right moment, spreads and throws the net over its victim (C). With its hind legs the spider wraps its bitten prey in silk thread, before transferring the bundle to its palps (A), leaving the legs free to build a new web as the spider is eating its catch (D).

SWEEP-NET TACTICS



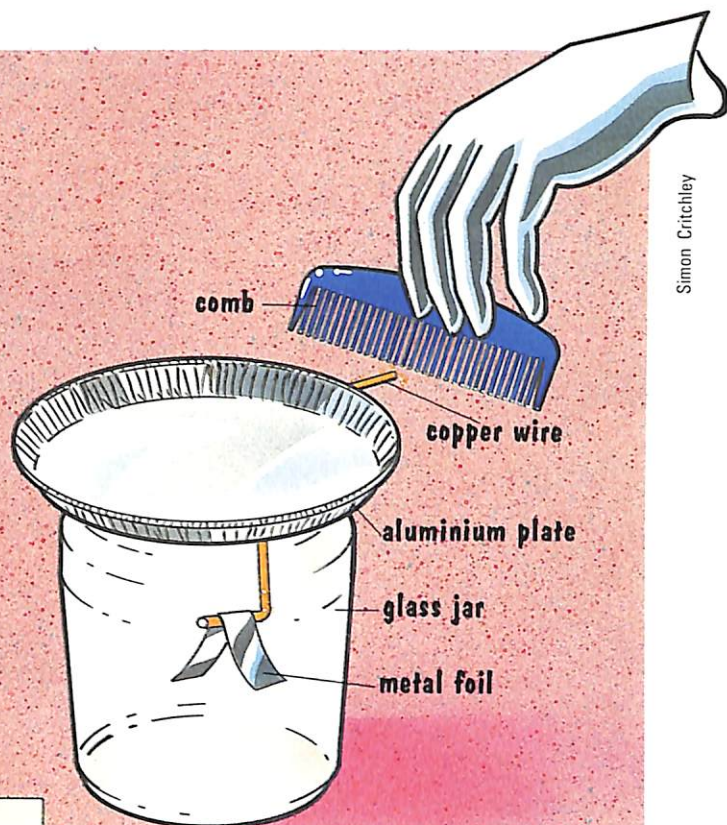
PROJECTS TOOLS

ELECTROSCOPE



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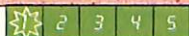
You need a glass jar, an aluminium plate, a length of copper wire and piece of thin metal foil. Bend the copper wire into the shape of a Z and hang it over the edge of the jar. Fold the foil strip and hang it over the lower horizontal part of the copper wire. Place the aluminium plate over the jar (a plain sheet of metal with round edges will do just as well). Charge the comb with static electricity by running it through your hair. Bring it up to the piece of exposed wire and you will notice the strips of metal repel each other. Any electrically charged object will have the same effect.



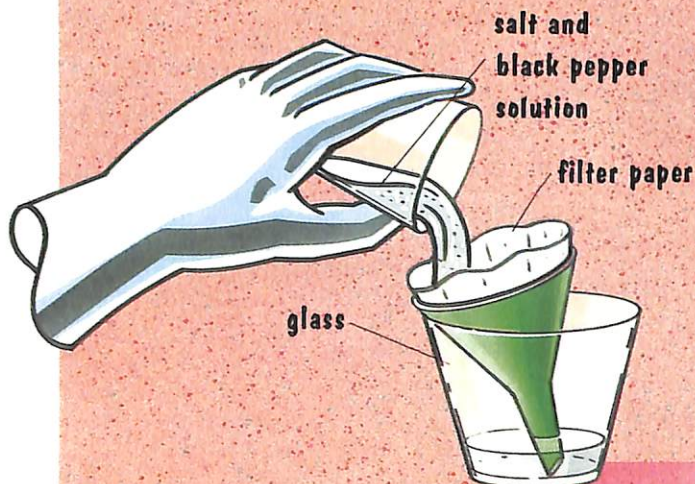
Simon Critchley

ADVENTURES IN THE WORLD OF SCIENCE

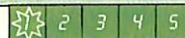
SALT AND PEPPER



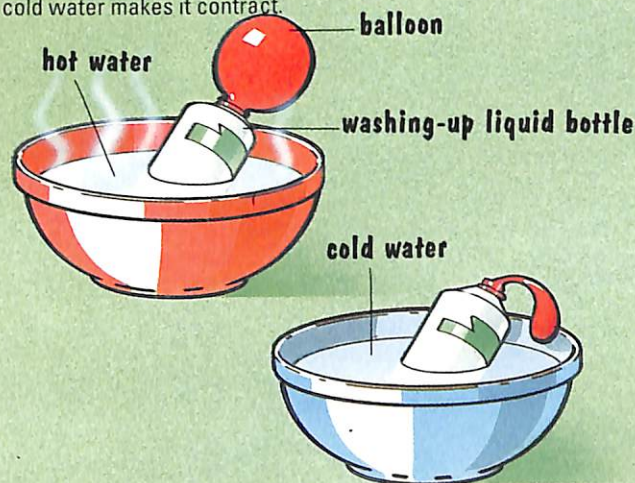
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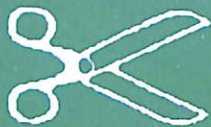
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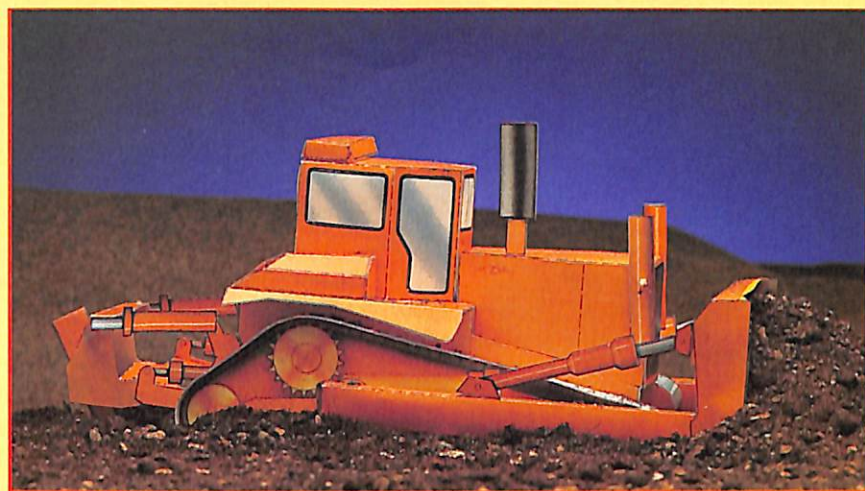
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BULLDOZER



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Straight pushing blade

1 Cut out **S** and form into tube. Cut out **T** and glue into shape. Cut out hydraulic ram **U** and fold down tabs. Glue larger tab to side of **T**, following positioning dots. Glue **S** on to circle on **T**. Repeat with **V**, **W** and **X**.

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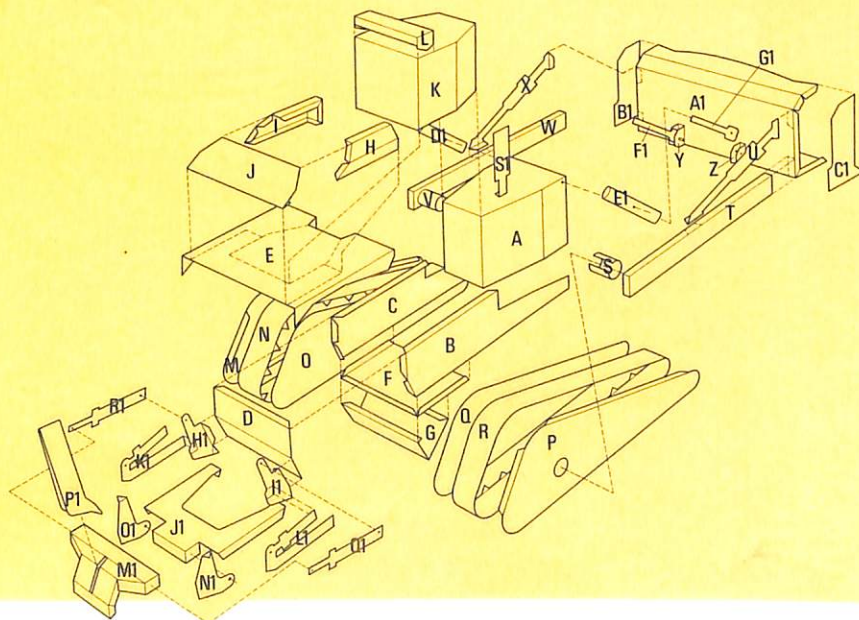
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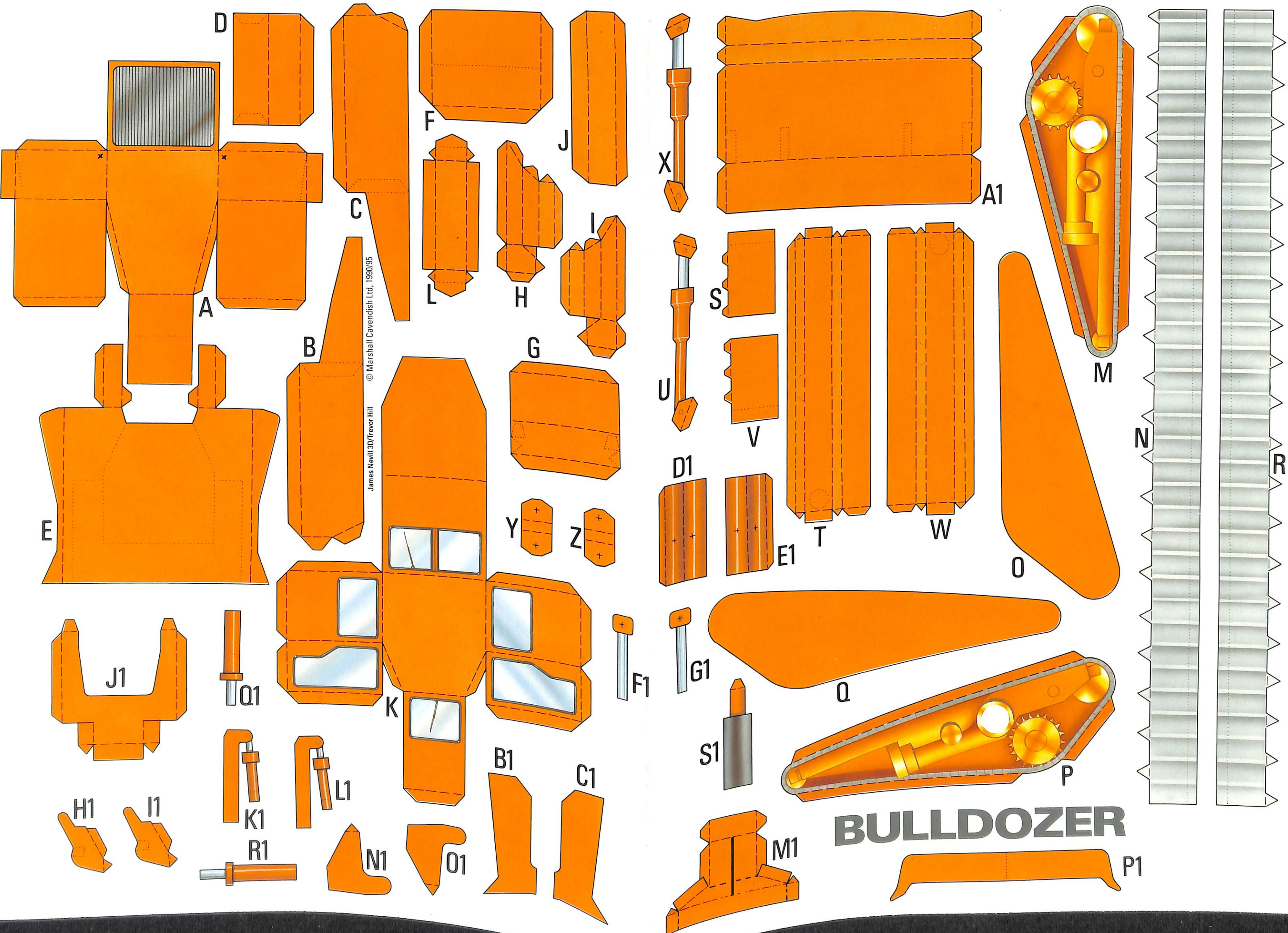
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3 To complete hydraulic rams, push **F1** into **E1** and **G1** into **D1**. Cut out exhaust **S1** and glue folded tab to top of **A**.





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BULLDOZER

P1